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THE ALPINE JOURNAL:

A RECORD OF MOUNTAIN ADVENTURE

AND

SCIENTIFIC OBSERVATION.

BY MEMBERS OF THE ALPINE CLUB.

EDITED BY DOUGLAS W. FRESHFIELD.

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MODERN MOUNTAINEERING. &c. (Continued III. IV.) By W. LORIMAN, F.R.S. &c.

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* Reported for 1874 Acting-a VOL.

MOUNTAINS AND MOUNTAINEERING IN THE FAR WEST—
continued. By E. T. COLEMAN.

MOUNT ST. ELIAS was first discovered on July 20, 1741 (old style), by Bering and his associates, who named it after St. Elias, the patron saint of the day. 'It is probable that they saw, about the same time, all the other high peaks of the adjacent region, though the fact is not mentioned in the imperfect records existing of the expedition. On May 3, 1778, Captain James Cook, in search of a north-east passage, saw a beautiful peak which he named Mount Fair-weather.*'

From the plates given in Vancouver's 'Voyages,' Sir Edward Belcher's 'Voyage of the *Sulphur*,' and an illustration in the above-mentioned report, St. Elias would appear to be the grandest, as well as the loftiest, mountain on the coast. Vancouver speaks of a 'still connected chain of lofty mountains, whose summits are but the base from whence Mount St. Elias towers, majestically conspicuous in regions of eternal frost.' Sir Edward Belcher says: 'Each range is in itself an object worthy of the pencil, but with the stupendous, proud St. Elias towering above all, they dwindled into mere hillocks, or into a most splendid base on which to place his saintship.' Mr. Dall before quoted says, 'pre-eminent in grandeur is the southern face of the mountain.'

The latitude and height of St. Elias and the other principal mountains in Alaska, as given in the list, were determined by a series of very careful observations made with the sextant, vertical circle, and theodolite, by the United States Coast Survey, under the direction of Mr. W. H. Dall and assistants. It is 'the latest and most precise contribution to our knowledge of the subject.'

The conclusion arrived at in the above-quoted Report is as follows:—'These Alps are, like the high Sierra of California, mainly composed of crystalline rock, and in their topography, their small, pustular, basaltic vents, their associated marbles, quartzites, and later conglomerates, exhibit a close parallel to the Sierras; the parallelism in structure and composition implies parallelism in age and method of formation; and finally, that the volcanic origin of the high peaks is opposed not only by analogy, but by the known facts. A glance at the accom-

* Report on Mount St. Elias, from the 'U. S. Coast Survey Report for 1874.' Appendix, No. — printed July, 1875. By W. H. Dall, Acting-assistant U. S. C. S.

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panying sketch will lead anyone, familiar with the types of mountain structure, toward the conclusion that these peaks are not of the volcanic type, and, even without confirmatory evidence, would lead to the suspicion that they were composed of crystalline rocks.'

'After a thorough search I have been able to find no trustworthy account of any eruption. Grewingk, discussing the same question, says, "Though St. Elias stands in the volcanic line of Tliamna, Nunwak, and St. Matthew's Island, nevertheless we believe its volcanic nature may justly be doubted, since the absence of a crater or conical form, and its ragged crest, make it very probable that it has never been penetrated by a volcanic chimney."

Mounts Cook and Vancouver, which are eastward of St. Elias and in the same ridge, were without distinct appellations. They were named in honour of those distinguished navigators, by the authority of the Superintendent of the United States Coast Survey.

Mount Crillon was named by the celebrated La Pérouse after the French Minister of Marine.

It is scarcely necessary to state that neither Mount St. Elias, nor any of the other great peaks, in Alaska, have been ascended.

Mount Brown, and a little to the south-east *Mount Hooker*, are in the Rocky Mountain chain, and have never been ascended. They were discovered about the year 1834 by David Douglas, the celebrated botanist, during one of his earlier journeys, in crossing the mountains with the Hudson Bay Company traders. He named Mount Brown after Robert Brown, Director of the Botanical Department of the British Museum, and Mount Hooker after Sir William Hooker, Director of Kew Gardens. According to Robert Greenhow,* Mr. Thompson, the astronomer of the Hudson Bay Company, measured these peaks among others, and estimated Mount Brown at 16,000 feet and Mount Hooker at 15,700 feet above the ocean level.

Humboldt says they 'are cited by Johnson as lofty old volcanic trachytic mountains under latitude $54\frac{1}{4}^{\circ}$, and longitude $117^{\circ} 40'$ and $119^{\circ} 40'$. They are therefore remarkable as being more than 300 geographical miles from the coast.'

Previous to the year 1858 the only pass across the Rocky

* 'Mémorial, Historical and Political, on the North-west Coast of North America and the Adjacent Territories.' By Robert Greenhow, Translator and Librarian to the Department of State, 1840.

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Mountains known to be within British territory was one between Mount Brown and Mount Hooker, known as the Boat Encampment, in latitude $54^{\circ} 10'$, but it was impassable for horses.

Mount Murchison is not marked in Colton's or Johnson and Ward's American Atlases, only on the latest maps. It was first discovered on September 18, 1858, by Captain Palliser, who in his Report of Exploration in British North America says that it occupies a central position among other high and precipitous mountains. 'The Indians say this is the highest mountain they know of, and, if a rough triangulation that I made of what I supposed to be the same peak from the Kootanie Plain is to be trusted, it must be 8,000 to 9,000 feet above that point, or 13,000 to 14,000 feet above the sea. The average altitude of the mountains is 11,000 to 12,000 feet above the sea, and I do not place much reliance on estimates of altitudes greater than that, as there is a striking appearance of uniformity in the altitude of the mountains. However, their shape, always partaking of a craggy nature, is very deceiving, and whenever I have been able to get any measurement I always found that I had underrated the true height.'

Mount Baker, fourteen miles south of the boundary line of the British possessions. It was so named by Vancouver, who first explored these coasts, in compliment to his third lieutenant Joseph Baker, who discovered it. Its Indian name is Tukullum, or White Stone. The height given in the list, viz., 10,814 feet, is from a trigonometrical measurement made by Captain Lawson, of the United States Coast Survey. By aneroid barometer I found it to be 10,695 feet; but as Captain Lawson informed me that his instruments were very fine, and as he is an officer of high scientific attainments, perhaps his estimate is the more correct of the two. It will be as well to remark here that the heights of these peaks, as given, do not furnish a standard of their height according to Alpine estimates of the snow and glacier travel to be got through in ascending a mountain. For, owing to the higher latitude, the snow line is much lower than in the Alps, consequently there is a greater amount of glacier or snow to be travelled over, as before hinted. I determined the snow line on Mount Baker to be 5,175 feet above the sea by aneroid barometer, but consider that for the coast generally it may be taken at 6,000 feet. So that a mountain of 11,000 feet in height on the Pacific slope affords as much ice and snow work as one of 13,000 feet in the Alps. Owing to the extraordinary clearness of the atmosphere, Mount Baker can be plainly made out from the neighbourhood

of Victoria, Vancouver Island, a distance of nearly eighty miles in an air line, and on its south-western slope enormous snow-fields are seen to extend very low down the mountain.

It was first ascended in August 1868, by a party which I organised, consisting of Mr. Thomas Stratton, Inspector of Customs at Port Townsend, Puget Sound, Washington Territory; Mr., now the Hon., John Tennent, now or late member of the Legislative Assembly for Washington Territory; Mr. David Ogilvy, of Victoria; and myself. I described the journey in 'Harper's Magazine' for November 1869, under the title 'Mountaineering on the Pacific,' and the main facts were reproduced in the 'Alpine Journal' for May 1872. In the latter part of October, 1864, an earthquake shook the coast, when an immense portion of the summit, estimated to be 1,000 or 1,500 feet, fell in, so that the appearance of the peak was decidedly altered as seen from Victoria, Vancouver Island, it being no longer conical and sharp, but truncated.

A very interesting ascent might be made on the south-eastern side, taking the course of the river Skagit, my ascent having been made by the river Lummi, or Nootsac, on the south-western side. A party following the route I propose would probably pass by the volcano and have an opportunity of examining the crater, without deviating from their track. The ascent might be made by the Frontin Glacier (mentioned in 'Harper's Magazine' before quoted) to the foot of the peak, on the opposite side to the point where we rested and took refreshment. Then following that side, and passing by the rim of the crater up to the summit, which I imagine, from a slight depression that I noticed in the wall of ice which flanks it, to be accessible at this point. The starting point for the journey would be the Utsalada sawmills, where Indians and supplies could be had. From Utsalada to the mouth of the Skagit is only six miles. From the mouth of the river to Baker's River, which heads in the mountain, and is probably fed by the Frontin Glacier, if it does not have its origin in that, is from forty to fifty miles. The length of Baker's River is about twenty miles. It is, however, necessary to state that there are greater difficulties by this than by the Lummi or Nootsac route. First there is or was a formidable 'jam' about six miles up the Skagit caused by drift lumber, blocking up the river at a point where there is a bend. So that on the occasion of my first attempt, the canoes, which were very heavy, had to be dragged across three portages, one of them perhaps a furlong in length, through swarms of mosquitoes, whose attacks are as much dreaded by travellers as an encounter

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with the grizzly bear. The second difficulty is the navigation of Baker's River, which is reported to be full of boulders, and very swift and turbulent. The chinook or salt-water canoes would have to be exchanged at the mouth of Baker's River for flat and smaller canoes, termed 'shovel-nosed,' suitable for navigating shallow streams. But difficulties only enhance the zest of an undertaking, and give a spice to it in the eyes of a true mountaineer. It would be advisable to proffer a request to the Superintendent of Indian Affairs at Olympia for Indians, as an official sanction to an expedition smooths away any difficulties that may arise connected with stranger tribes. The United States officials are very courteous, and ready to afford every facility to those engaged in exploring the country.

Some notes by Dr. Brown on the geology and flora of Mount Baker, as illustrated by specimens which I sent him, are appended to the end of this article.

An *unknown mountain*, mentioned in the list. This I observed when on Mount Baker. It is a solitary peak, apparently from 8,000 to 9,000 feet in height, and distant from fifteen to twenty miles to the south-east. It is not marked on the maps as a separate mountain, though a spur of the Cascade range is given in that direction. From the cursory view I obtained in ascending Mount Baker it appeared to be isolated.

Mount Rainier was named by Vancouver after his friend Rear-Admiral Rainier. The Indian name of this mountain is generally given as Tacoma, but a tribe on the Cowlitz Pass pronounces it Tah-ho-ma. According to the latest authority on the subject, it is 14,444 feet above the sea-level.* As it can be seen from the neighbourhood of Beacon Hill, Victoria, Vancouver Island, a distance of upwards of 140 miles on an air line, its height must be great.† The general form of the

* Lists of Elevations, &c., published by the Department of the Interior, United States Geological Survey of the Territories, under F. V. Hayden, U.S. Geologist in charge.

† Humboldt, speaking of the Peak of Teneriffe, says that if the height 'is 12,182 feet, as indicated by the last trigonometrical measurement of Borda, its summit ought to be visible at the distance of 148 miles, supposing the eye at the level of the ocean, and the refraction equal to 0.079 of the distance.' He further says that 'the Peak of Teneriffe has often been observed at the distance of 124, 131, and even 138 miles, and the summit of Mowna-Roa, in the Sandwich Islands, which is probably 16,000 feet high, has been seen at a period when it was destitute of snow, skirting the horizon, from a distance of 183 miles. This is the most striking example yet known of the visibility of high land, and is the more remarkable that the object was negatively seen.'

mountain is that of a great pyramid. The summit consists of a central peak, flanked by two lower and smaller ones, both as nearly as possible of the same size and shape. Mr. A. D. Richardson, the well-known correspondent of the 'New York Tribune' in former years, speaking of the scenery of Puget Sound, says: 'Some of the boldest mountains of the continent are here visible—Baker, Adams, St. Helens, and, more than any or all others, Mount Rainier, triple-pointed and robed in snow. Shasta is grand; Hood is grander; but, from this stand-point, Rainier is monarch of all—the Mont Blanc of this coast.*' It is distant about seventy-five miles from the shores of Puget Sound, and may be approached either from Steilacoom or Olympia. In 1869 I proposed to General Stevens of Olympia, formerly of the United States army, to attempt the ascent of this mountain. He was unable to go with me, but next year announced his willingness to undertake the journey. Mr. Van Trump, also of Olympia, joined us, but an accident which befel me when near the base of the mountain prevented my attempting the ascent, which General Stevens and Mr. Van Trump successfully accomplished, being the first on record. The base of the mountain is at least six days' journey from Olympia, the capital of Washington Territory. For the first thirty miles there is a good waggon road. The remainder of the journey is by a trail cut through the forests and leading to the Cowlitz Pass. It was originally made several years before my visit by two settlers, for the purpose of prospecting on the mountain, but has hardly ever been used since, so that at the time of our journey it was overgrown, and in many parts difficult to trace. We were, however, fortunate in being accompanied by Mr. Longmire, one of the settlers above alluded to. The general course of the journey follows the Nisqually River, which heads in a glacier on the south-western side of the mountain, the same which was examined by Lieutenant, now General, A. V. Kautz, as mentioned in the first article. General Stevens informed me that they did not meet with any special difficulties on their route for about the first five miles, or two-thirds of the way, being a gentle slope. But the latter portion is steep. They were just 10½ hrs. in making the ascent, during all which time, being in excellent training, they worked hard, and were not obliged to retrace a single step. The aspect of the summit has been already described in the first article.

Mount St. Helens was named by Vancouver after His

* 'Our New States and Territories.'

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Britannic Majesty's Ambassador to the Court of Madrid. Commodore Wilkes, U.S.N., estimated it to be 9,550 feet above the ocean, and says that it 'may be seen from the sea when eighty miles distant.*' It is the only instance of the dome-shaped formation on the coast. Its smooth and sperical form, undisfigured by rocks or scars, captivates the eye. Humboldt's notice of it has been given in the first article on this subject, when treating of the volcanic activity of these mountains. Mr. Thomas J. Dryer of Portland, formerly editor of 'The Weekly Oregonian,' who first made the ascent of Mount Hood, was the first to ascend this mountain in the year 1850. He published an account of it in the above mentioned journal.

Some notion of the difficulties attendant upon mountaineering in these new countries may be formed from the fact that a party which started a few years since from Portland, for the ascent of Mount St. Helens, never even reached its base, and was obliged to return after an absence of about a fortnight, its time being limited.

Mount Adams is nearly due east of Mount St. Helens. It was named after John Quincy Adams. Little or nothing is known respecting this mountain. I believe that it has never been ascended. Professor Whitney, in the paper before quoted, states that Mount Adams, the next high point north of Mount Hood, was measured by Dr. Vansant, U.S.A., trigonometrically at 13,258 feet. Dr. Brown sets down this mountain at about 9,000 feet.

Mount Hood.—A careful measurement of the height of this peak was made by Lieutenant-Colonel Williamson, of the U.S. Topographical Engineers. His instruments consisted of cistern barometers, graduated so as to read to the 1-2000th of an inch, and wet and dry thermometers easily reading to the 10th degree. At the summit, the barometer estimated for a temperature of 32° Fahrenheit stood at 19.941 inches. Making the necessary computation, the height was found to be 11,225 feet.† It is the most conspicuous peak the traveller sees on his journey up the Columbia River, and is remarkable for its symmetry; consequently, it is a favourite subject with artists.

It was first ascended by Mr. Thomas J. Dryer, before mentioned, and W. Lake, in August, 1854. Humboldt's statement that it was ascended by 'Lake, Travaiillot, and Heller' is wrong as regards the two latter, and wrong as

* 'Voyage Round the World.'

† 'Scientific American,' January 18, 1868.

regards the omission of Mr. Dryer's name. Captain Travillot, Major Haller (not Heller), and Judge Olney, started with Messrs. Dryer and Lake, but had to turn back, all three of them being taken ill at an elevation of $701\frac{1}{2}$, as marked by the theodolite. As before stated, Mr. Dryer wrote an account of his journey in the 'Oregonian,' a file of which is kept at the office in Portland. In the first article I have given some data as to its volcanic character. I joined a party for the ascent, but we were foiled at the foot of the peak by bad weather, and had not sufficient provisions to enable us to make another attempt.

The mountain is near to Portland, being not more than sixty miles distant by a good waggon road, and the country settled up to within fifteen or twenty miles of its base. In consequence, and owing as well to the absence of difficulties, it has been often ascended. The only obstacle is a bergschrund at the foot of the peak, estimated by different travellers to be from 500 to 700 feet below the summit. But it is only occasionally that any trouble is experienced. It can generally be jumped over, or crossed by a snow bridge. I know of an instance where a party, being unprovided with an axe for cutting steps after crossing the crevasse, actually had to turn back. It was for a long time believed that there were not any glaciers, as there are none on the side always ascended. This was doubtless owing to the ignorance of travellers, as, once on the summit, glaciers ought to have been noticed by any experienced observer. But in the year 1870, Mr. Arnold Hague, Assistant Geologist in the U. S. Geological Exploration of the 40th parallel, accompanied by Mr. A. D. Wilson, Topographer of the survey, visited Mount Hood under the instructions of Mr. Clarence King mentioned in the first article, for the purpose of examining the geological and lithological character of the extinct volcano. 'The summit of Mount Hood exposes on the east, north, and north-west sides a bold, precipitous, jagged mass of rock, which forms the outer wall of the old crater, encircling it for three-fifths of the circumference. The remaining portion of the wall is wanting, the other two-fifths presenting a comparatively easy slope down to the timber-covered ridges below. The crater is nearly half a mile wide from east to west. The wall upon the inner side rises above the snow and ice, filling the basin some 450 feet, while upon the outer side it falls off abruptly for 2,000 feet. This rim of the crater is very narrow; in many places the crest is not more than two feet wide. Three distinct glaciers have their origin in this basin, each the source of a stream of considerable size; the glaciers

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of the White, the Sandy and Little Sandy Rivers. The White River glacier heads on the eastern side of the crater, and extends in a south-easterly direction. It is nearly a quarter of a mile wide at the head, and about two miles long, extending 500 feet below the line of timber growth upon the sides of the mountain. . . . The glacier of Sandy River is considerably broader than the glacier of White River. In length they are about equal. . . . One of the most marked geological and topographical features of Mount Hood and the vicinity is its very extensive system of extinct glaciers, which everywhere gouged out immense trough-shaped valleys, cutting down deeply into the earlier trachytic lava flows of the old volcano.*

With reference to these last described peaks, Professor Whitney says: 'Dr. J. G. Cooper, who is familiar with the mountains of Oregon and Washington Territory, considers Mount Hood not as high as some other peaks of the same range. Other experienced observers have stated the same to me. On the whole I conclude that Mount Hood is not as high as Mount Shasta, Rainier, or Adams.'†

Mount Jefferson, The Three Sisters, Diamond Peak, Scott's Peak, and Mount Pit.—It is doubtful whether any of these peaks have been ascended. Mount Jefferson received that name from Lewis and Clarke in 1805. The Three Sisters present three pyramidal peaks, all nearly of the same height as seen from Mount Hood. Diamond Peak is so called from a settler of that name, who, being chased by the Indians took to the mountain, and lay concealed there for two or three days. It is doubtful whether he ascended to the summit. Dr. Brown says that 'Mount Scott presents the appearance of a truncated cone, and is, doubtless, likewise an extinct volcano.' According to the same authority, Mount Pit, which is a little to the west of Lake Tlamat, 'has never been ascended. The name is often spelt Pitt, but erroneously, the title being derived, not from the statesman, but from the number of pits dug by the Indians near its base. Its other name is derived from Dr. McLaughlin, long Governor of the Hudson Bay Company, and a name deservedly held in deep veneration in the north-west.' According to Humboldt its height is 9,548 feet. Robert Greenhow, before mentioned, says that 'Mount Madison is the Mount

* The 'Engineering and Mining Journal,' New York, March 7, 1871.

† 'Which is the Highest Mountain in the United States, and which in North America?'—'Proceedings of the California Academy of Sciences,' vol. ii. 1858-62. San Francisco, 1863.

Maclaughlin of the British maps,' and that 'Mount Jackson is a stupendous pinnacle under the parallel of $41^{\circ} 40'$ called by the British Mount Pitt.'

It has been reported to me that there is a very high and precipitous wall of rock round the summit of Mount Jefferson, so that it is apparently impracticable, but it is improbable that this extends entirely round the peak. The Three Sisters is said to be a very steep mountain.

Mount Shasta.—Professor Whitney, in the paper before quoted, says that there is no uncertainty regarding the height of this mountain, for 'a careful series of barometrical observations by the State Geological Corps in September 1862, fixed it at 14,440 feet.' There are not any glaciers on the south side. Here the ascent is very easy, there is a good track, and it can be followed all the way up to the summit on a mule's back. In early September, 1870, Mr. Clarence King with a small detachment of the U.S. Geological Exploration of the 40th parallel, acting under the orders of Major-General Humphreys, visited this mountain. On September 11 they climbed to the top of the lesser Shasta, a conical secondary crater jutting out from the main mass of the mountain on its north-west side. 'In the afternoon, at about half-past 1 o'clock, we reached the rim of the cone, and looked down into a deep gorge lying between the secondary crater and the main mass of Shasta, and saw directly beneath us a fine glacier, which started almost at the very crest of the main mountain, flowing towards us and curving around the circular base of our cone. Its entire length in view was not less than three miles, its width opposite our station about 4,000 feet, the surface here and there terribly broken in 'cascades,' and presenting all the characteristic features of similar glaciers elsewhere. The region of the terminal moraine was more extended than in the Alps.' The following morning they ascended to the extreme summit. 'From the crest I walked out to the northern edge of a prominent spur, and looked down upon the system of three considerable glaciers, the largest about four and a-half miles in length, and two to three miles wide.'*

Conclusion.—This concludes all the information which I have been able to gather respecting the mountains of the Pacific slope, a region which, though vast in itself, forms but a section of the great American continent, and has as yet been but little explored. While it offers a large and fertile field to the man of science, it possesses peculiar opportunities for those

* 'Engineering and Mining Journal,' of New York, March 7, 1871.

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pursuits, which are entered into with so keen a zest by many of the members of the Alpine Club.

Notes by Dr. Robert Brown, M.A., F.R.G.S., Ph.D., F.L.S., late President of the Royal Physical Society, Edinburgh, on specimens of rocks and plants collected on Mount Baker by the author of the foregoing article.

GEOLOGY.*

1. 'From River Bottoms, twenty and fifty miles from the summit, according to route travelled, of course less as the crow flies.'

Various rolled fragment of vesicular lavas of recent origin. One or two specimens of tufas, apparently of red volcanic ash, though of an old date, as the specimens are consolidated, and in the interstices are various *minerals*, chiefly *apatites*, &c. There are also two bits of trap, the variety 'dolerite' being the principal form. The other specimen is a bit of crystalline limestone or marble, of a yellowish white colour. Marble is common in various parts of the neighbouring country.

2. 'From the mountain above the snow-line, between 7,300 feet and the summit.'

Mass of very recent volcanic ash, only partly consolidated, undistinguishable from some from Vesuvius of last year's eruption; slaggy scorie of common volcanic type; dark lava, not very vesicular, and of an ancient date; various tufas, one almost identical with the beds on either side of the stairs leading from Waterloo Place up the Carlton Hill, at Edinburgh, and which Maclaren ('Geology of Fife and the Lothians,' p. 69) designated by the now rather vague name of 'porphyry.'

The whole of this set shows clearly the occurrence of repeated eruptions of the mountain, with the usual accompaniments of lava, ashes, &c., the older lavas approaching in appearance some of the more recent tufas, such as those of Disco Island, in Greenland; the newer ones, or tufas, slightly varied, being one and all of the usual type found in the vicinity of volcanic cones.

3. 'From sleeping-place, Bennett and self, 9,265 feet.'

This appears to be a calcareous deposit from some hot spring. Were there any signs of such springs in the vicinity? It is of a character not uncommon in some parts of the world, but is very loose and crumbling.

4. 'Lava older than ours. Dr. Comrie.'

A black lava full of vesicular cavities, weather-worn, but not amygdaloid; identical with specimen I have from Iceland.

5. 'From a thin vein of sandstone close to the nevé.'

The only thing I can see remarkable about it is a little bit of lava in

* Dr. Brown, in a letter to the author referring to the specimens, says, 'They are very interesting as showing the thoroughly volcanic character of the mountain.'

the sandstone. Was not a trap dyke in the vicinity? or does not this 'thin vein' owe its consolidation to the overpouring of the lava-stream upon it?

6. 'Mud from self and Bennett's sleeping-place. Same formation as that preceding, from summit, 9,265 feet above sea-level.'

Old tufa, with a whitening calcareous deposit, apparently from the same spring as that referred to in No. 3.

7. 'From the mountain above the snow-line.'

It seems a mass of white siliceous sinter from a hot spring, such as are common in Iceland and other volcanic countries.

8. 'From highest exposed rocks, near the summit.'

Old volcanic tufa, with crystals of augite.

9. 'First day's descent.'

A bit of lava, with a thin coating of sulphur on it.

10. 'From summit of highest point of visible rock, rolled down from cornice while making step. Picked up while rolling down.'

Limestone. Though it looks as if it had been comparatively recently deposited from some calcareous spring. Was there a stratum or bed of it?

11. 'Outside shell of extinct crater next the peak on that side, 7,300 feet. A kind of conglomerate.'

It is a dull compact felspathic lava or greenstone (trap).

FLORA.*

Saxifraga spathulifolia. Common everywhere.

Saxifraga Oregana. Swamps at 4,000 feet.

Saxifraga stellaris (?) On ridge leading to fourth day above Ptarmigan.

Saxifraga tridentata. A true Alpine.

Polypodium phegopteris. A common fern in all temperate countries.

Polypodium Dryopteris. Much the same places as *P. phegopteris*.

Adiantum pedatum. A very beautiful Maiden's Hair fern. Low down; common at all altitudes.

Ceratocloa breviaristata. A grass.

Epilobium angustifolium. Willow herb.

Geranium incisum.

* Note by Dr. Brown:—'I enclose you a few notes on your Mount Baker plants. I am sorry that they are so incomplete, but many of the plants were in a condition which rendered it all but impossible to make at the species, without comparison with authentic herbarium specimens, and even then with difficulty. Some of the localities seem curious for the species, but as I have nothing save the labels to go on, I can simply take them as they are given.'

Note by the author:—'In addition to the above, Mr. John Bennett (who formed one of the party on the first attempt to climb the mountain) claimed to have been the first to discover the true Scotch heather within the limits of the United States. He wrote an account of it, and sent a specimen to one of the learned societies of New York; though, as Dr. Brown always finds the specimens labelled "heather" to be a *Menziesia*, considerable doubt is thrown on the "discovery."

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Gentiana. Swampy places.

Enothera biennis. Open sunny places.

" *vinosa*.

Senecio aureus (?)

Hieracium Scouleri.

Lathræa (?)

Phleum (?)

Oxyria (?)

Menziesia empetriformis. Always marked as 'heather;' from 5,000 to 6,000 feet.

Mimulus luteus. Monkey flower.

" *moschatus*.

Corydalis Scouleri. 3,000 ft., forest, deep shade.

Arnica amplexicaulis.

Tridentalis Europæa.

Hosackia Purshiana (?) On ridge leading to second day.

Lupinus sericeus. On ridge leading to fourth day's camp above Ptarmigan.

Arctostaphylos uva-ursi. " " " "

Erythronium grandiflorum.

Campanula linifolia.

Pyrola elliptica.

The moss without fruit was a *Hypnum* apparently.

The plant found at the highest point on the mountain is only represented by a leaf, but is apparently a *Gnaphalium*.

The true juniper, found higher than any other trees, was also only a twig, but appears to be *Juniperus communis*.

There was also on the same card (collected by Mr. Bennett), along with a bit of *Menziesia*, a fragment of *Cassiope tetragona*, and a *Potentilla*. One *Menziesia* is marked as having purple flowers. It is apparently *M. ferruginea*, but there are no flowers.

As for the species of *Abies* and *Pinus*, I found nothing in the parcel but a mass of leaves. Without cones I could only guess at the species. Still I have made out that high on the mountain are found, as on most mountains in N.W. America, *Abies Pattoniana*, and a *Larix*, probably *L. Lyallii*, in addition to the common country *Conifere* lower down.

ALPINE NOTES.

ASCENT OF ILLIMANI.—The following extract is from 'Nature':—'In our number of August 9 we briefly noticed the ascent made by M. Wiener of the mountain Illimani, one of the highest—if not the highest—of the Bolivian Andes, which forms a noble object from the city of La Paz, and was formerly reputed (on the authority of Mr. Pentland) to have an altitude of no less than 24,200 feet.* M. Wiener, however, makes its height only 20,112 feet, while Mr. Minchin, as we

* Humboldt, however, gives 21,145 feet.—Ed.

have already observed, places its altitude at 21,224 feet. If the latter estimate be correct, M. Wiener has, we believe, not only made the highest ascent which has been made in the Andes, but has attained a greater altitude than has hitherto been reached on the earth out of Asia, and in Asia has only been beaten by Mr. Johnson, who some years ago got to a height of 22,300 feet in Cashmere. As the recorded ascents to the height of 21,000 feet are extremely few, we shall be glad to hear further particulars respecting M. Wiener's exploit, and more especially whether he experienced much exhaustion through the rarefaction of the air. Practised mountaineers who have climbed to a height of 17,000 to 18,000 feet have been of opinion that even at such altitudes there is a very important and perceptible diminution of the bodily powers, and think it probable that the height of 25,000 or 26,000 feet will be found to be about the limit which will ever be reached on foot. As a set-off to this opinion we may mention the facts that hunters in the Himalayas frequently pursue their game at heights exceeding 20,000 feet without experiencing any notable inconvenience from the low barometric pressure, and that natives living on the base of Demavend, near Teheran, often ascend to its summit to gather sulphur from its crater without any great difficulty. The height of this mountain, there is reason to believe, also exceeds 20,000 feet, although it has never been accurately determined.* If, therefore, severe work can be done with impunity at such elevations, it seems not unreasonable to suppose that much greater heights might be attained by men who had previously accustomed themselves to life at high altitudes. Aeronauts, anyhow, have proved that life can exist at 30,000 feet above the level of the sea, and that at 25,000 feet and upwards one may positively be comfortable if sufficiently warmly clad. That such is the case is sufficiently remarkable, for "travellers in the air" have to sustain incomparably more rapid variations of pressure and temperature than mountain-climbers. Mr. Glaisher, on his memorable ascent on September 5, 1862, left the earth at 1 P.M., and in less than an hour shot up to a height of 30,000 feet. At starting, the temperature of the air was 59 deg., and at its greatest altitude it was 61 deg. lower. Mountaineers experience no such extreme variations as these. They rarely ascend more rapidly than 1,000 feet per hour, never so much as 15,000 feet in a day, and become to some extent acclimatized as they progress upwards. On the whole we are inclined to think that man will not rest until he has at least attempted to reach the loftiest summits on the earth, though we will venture to assert that it will be long before anyone crushes down the snow on the summit of Mount Everest.

CIMA DI NAFDISIO (FRESHFIELD), or CIMA DI VALLON (AUSTRIAN GOVERNMENT MAP).—On September 11, 1877, Messrs. R. Gaskell and M. Holzmann, with A. Lacedelli, of Cortina, as guide, made the first

* *Demavend*.—Capt. Narier, under date Teheran, November 15, 1877, writes to Mr. Moore as follows:—"I have been up Demavend again with a new barometer I brought out, and have reduced the height to 18,500 (or, exactly 18,493) feet." See *Alpine Journal*, No. 57, p. 261.

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